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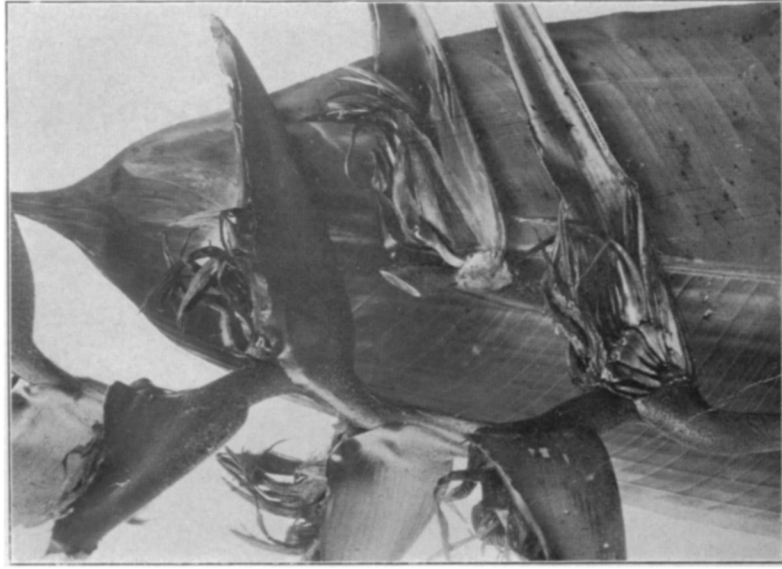
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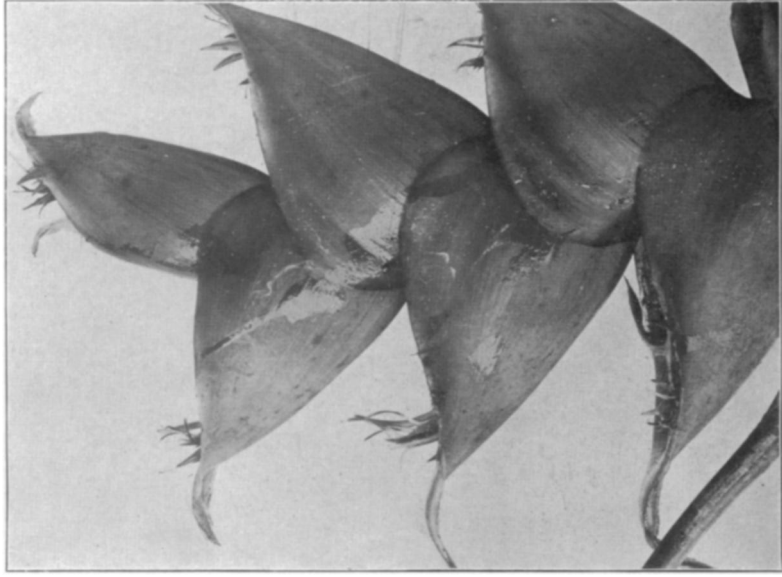
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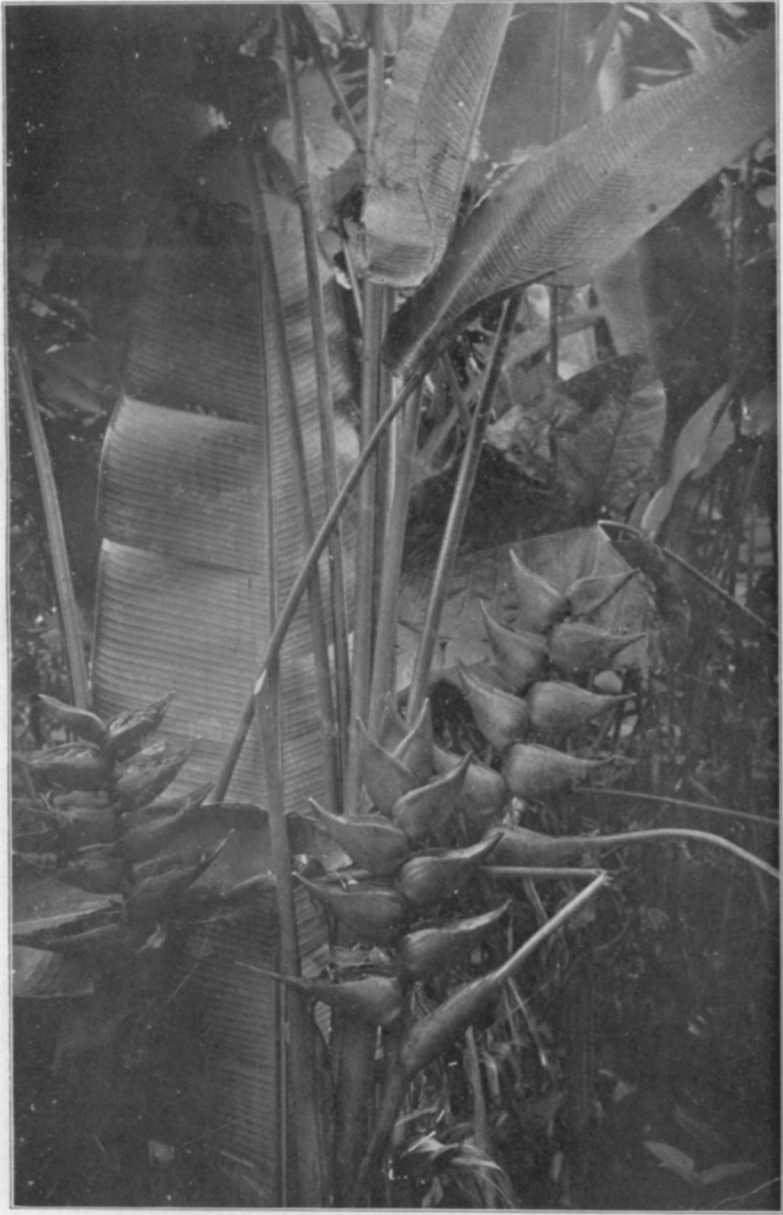
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1. *HELICONIA TORTUOSA*



2. *HELICONIA BORINOUENA*



HELICONIA CHAMPNEIANA

BULLETIN
OF THE
TORREY BOTANICAL CLUB

DECEMBER, 1903

On Some Species of *Heliconia*

BY ROBERT F. GRIGGS

(WITH PLATES 29 AND 30)

Heliconia occupies in America the place in plant society that is filled by the banana and its congeners in the Old World tropics. Its anatomy is similar to that of its better-known relative. Like the banana it is a very difficult subject for the botanical collector. The parts are both thick and succulent and of such size as to make it impossible to represent the plant at all adequately on an herbarium sheet. As knowledge of plants from remote regions has been largely dependent on herbarium specimens, it is not difficult to appreciate that *Heliconia* has been an unsatisfactory genus to work on. Only once before the present study was undertaken has it been studied to any extent in the field. This fact accounts for most of the innovations suggested in the present paper.

Although the genus has been monographed several times within recent years, as far as practicable recourse was had to original literature in determination and comparison. Appended to the paper is a list of the papers consulted. It includes the original descriptions of twenty-six of the twenty-nine recognized species. Though no pretension is made to bibliographic completeness, it may serve as the beginning of a guide to anyone who desires to take up the study of the genus, as it is believed that with a few exceptions most of the important literature is cited.

All our plants, except the Porto Rican *Heliconia Boringuena*, came from a region in eastern Guatemala, which centers in Messrs. Owen and Champney's coffee *fincas* Sepacuité, a few miles north of

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Senaju. From there trips were made northeastward to Cahabon and in a more easterly direction up the valley of the Oxec, a good-sized creek emptying into the Cahabon river ten miles below the town. In addition, the most abundant species at least were collected along the road from Panzos to Sepacuité. We were informed that the region had never been visited by a botanist, the nearest that one had been being Senaju, where Captain John Donnell Smith made a short stop. The mountains about Sepacuité, which is about 3,000 feet above sea-level, are heavily forested and in nearly their primeval condition. Here one species, *H. tortuosa*, is very abundant. Few of the species, however, are forest plants. Around the old Indian town of Cahabon the country has been reduced to an almost treeless, grass-grown desert, and on the edges of this desert where the woods are not very thick and yet the water-supply is sufficient, most of the species were found. Along the road from Panzos to Sepacuité much the same conditions prevail as around Cahabon.

We wish to express our thanks to the owners of Sepacuité, to Mrs. Owen especially, and to Mr. Alfred Rock, of Setzimaj, for their kind hospitality and for the very great assistance they so eagerly offered us, without which it would have been impossible to make our collections. I am very grateful to Mr. John Donnell Smith, of Baltimore, for the loan of all of his material on the genus, and to Dr. W. A. Kellerman, of the Ohio State University, for valuable criticism and suggestions. Thanks are also extended to the officers of the National Herbarium for the loan of specimens.

The references after the descriptions, *v. g.*, "*no. 258*," are to the collectors' numbers accompanying the sheets. Except where otherwise stated, all the plants are from a collection made by Mr. O. F. Cook and myself during March and April, 1902. This collection was made for the United States Department of Agriculture and is deposited in the herbarium of the department in the National Museum. The numbers of photographs cited are either serial or field numbers of the collection in the Office of Tropical Agriculture of the Department.

Key to the Groups and Species Discussed in this Paper

- I. Leaves borne at intervals along an elongated stem, *i. e.*, with the habit of a *Zingiber*; mostly small (*H. psittacorum*). Subgenus STENOCHLAMYS Baker.
 - A. Leaves narrowly oblong, sessile, almost clasping the stem; peduncle short or absent; branch-bracts red, narrow. *H. Choconiana* Wats.

- B. Leaves lanceolate or ovate-lanceolate, rounded or subcordate at the base; mostly petioled; peduncle at least as long as the rachis; branch-bracts yellow with red cheeks, broad, often subovate. *H. crassa.*
- II. Leaves all borne from nearly the same point on the stem, as in *H. Boringuena* (f. ♂); mostly very large.
- A. Branch-bracts more or less spaced out on the rachis, not overlapping, except at the base (*H. Bihai*). Subgenus PLATYCHLAMYS Baker.
- a. Inflorescence pendulous from a long flexible peduncle, glabrous; rachis very flexuose, internodes long, bracts narrow, red; leaves very glaucous beneath. *H. Collinsiana.*
- b. Inflorescence erect.
1. Inflorescence long-peduncled.
- (a) Branch-bracts very close together, narrow, truly distichous, horizontally extended; rachis very straight. *H. librata.*
- (b) Branch-bracts distant, not strictly distichous; rachis very flexuose.
- (1) Inflorescence scarlet, hairy, below the bases of the leaves; leaves green on both sides. *H. tortuosa.*
- (2). Inflorescence orange, glabrous, with a very long peduncle which raises it up among the leaves; leaves slightly glaucous below. *H. latispatha* Benth.
2. Inflorescence sessile; rachis straight; branch-bracts narrow, distant, red and yellow, covered all over with short velvety pubescence. *H. spissa.*
3. Inflorescence sessile or very short-peduncled; branch-bracts very broad and close together, often clasping each other at the bases and concealing the stiff, straight rachis.
- (a) Branch-bracts green with red cheeks; leaves green on both sides when well developed, very long, long-cuneate at the base. *H. elongata.*
- (b) Branch-bracts bright orange; leaves glaucous below, at least when young, shorter, not cuneate.
- (1) Stem upright; leaves turned in all directions, soon green beneath; tips of the branch-bracts acute or bluntish, somewhat incurved and involute; Guatemalan. *H. Champneiana.*
- (2) Stem inclined; leaves all spread out horizontally, very glaucous beneath; tips of the branch-bracts long-acuminate, recurved and revolute; Porto Rican. *H. Boringuena.*
- B. Branch-bracts very close together on the rachis so as to form a compact flat spike, somewhat resembling the rattle of a rattlesnake (*H. imbricata*). Subgenus TAENIOSTROBUS Kuntze.
- Inflorescence pendulous on a long peduncle; plant very large. *H. Mariae* Hook. f.

It will be noticed that in this key the species are arranged in a considerably different way from that used by former writers. Baker and Schumann divide the genus into two subgenera characterized by broad and narrow branch-bracts respectively. Under

these subgenera the species are arranged according to an artificial key. This arrangement often separates widely species which are very similar except in some unimportant character, and thus ignores the existence of natural groups smaller than the subgenus. That such groups do exist is certain, *e. g.*, that referred to under *H. Champneiana* and that to which *H. tortuosa* and *H. latispatha* belong. It is believed that their recognition will be of material assistance in the study of the genus. The delimitation of the subgenera has also been considerably emended. It is not to be denied that the shape of the branch-bracts is in a general way correlated with the relationships of the species, but it is only an accidental parallelism without much physiological importance, for there are many exceptions — species quite similar in all respects except that the branch-bracts are sufficiently different to place them in different subgenera as heretofore defined; for instance, *H. tortuosa* and *H. latispatha*. It is an undesirable character to use in a key because of the difficulty of application and the liability to error. In the inflorescences of several species the lower branch-bracts are lanceolate, while the upper are ovate and the intermediate neither one or the other. Besides, there are several species whose branch-bracts are ovate when fresh, but shrink so as to be lanceolate in the herbarium specimen.

Two of the subgenera, *Stenochlamys* and *Taeniostrobus*, are natural groups, but the third, *Platyochlamys*, the name of which must of course go with the type, comprises simply the residue. Its present application can be considered only provisional. The extreme form of *Stenochlamys* (*H. psittacorum*) is very different from the members of the other two groups, but the difference is of only subgeneric importance, for these extremes shade through a series of intermediates into the other groups. This is true whatever characters are used to distinguish them, whether the width of the bracts or the habit, but the habit represents a natural difference of some physiological significance; and it seems to me to accord with the probable relationship of the plants.

In the groups with the typical *Heliconia* habit, those species with erect inflorescences have been separated from those whose inflorescences droop. The importance of this character seems not to have been appreciated heretofore because of the lack of

field study, and the descriptions of more than one species would have them with indifferently erect or drooping panicles. But it seems very probable that such inferences are the result of identifying two species as one. The ecological relations of the plants in the two cases are quite different. The bracts in the erect inflorescence are always full of water, into which numerous insects fall and decay, and in species like *H. Borinquena* the floral parts themselves are always more or less rotten. The fruit of such species ripens under water; and both flowers and fruit have the full benefit of the sun. But in the pendent inflorescence the flowers are shaded from the sun and rain by the roof-like bract above them, and are subjected to very different conditions. It is a question whether the erect-flowering species are insectivorous or not. If they are not, they would have only to utilize a food supply already present to become so. That this habit is no mere accidental peculiarity of the individual plant will be realized at once by any one who sees in the field how constantly the species adhere to it. With very rare exceptions the erect-flowering species always bear the inflorescence erect, no matter what may be the position of the stem, and vice versa. It is as constant as any character they possess.

Another character which has not received the attention it deserves is color in the inflorescence. The neglect of this is due largely to the method of dealing with dried specimens from which it is absent. My own observation in the field goes to show that it is one of the least variable characteristics of the genus. The shape of the parts, their relative size, and the presence of hair and glaucescence — these are variable and must be used carefully. But in the study of several thousand individuals of the more abundant species no variation in color was detected. The colors of the inflorescence are nearly always bright, but never delicate or such as are usually subject to variations.

HELICONIA CHOCONIANA S. Watson.

Whole plant glabrous, slender, as much as 2 m. tall: leaves reaching a length of 33 cm. and a breadth of 7 cm., oblong, acute or short-acuminate at the apex, cordate and almost clasping the stem, green on both sides: peduncle sometimes as much as 7 cm.

long; rachis flexuose, deflexed; lowest fertile bract 7 cm. long, 2 cm. broad; pedicels 12 mm. long; berries red and yellow, 9 mm. in diameter in the dry specimen.

Our plants (*no.* 757) were larger than Watson's and the peduncle is longer; otherwise they are very similar. They were growing in deep shady forests at Cherujija Oxec, about fifty miles west of the original locality.

Donnell Smith's *no.* 8019, collected by von Türckheim at Cubilquitz, Alta Vera Paz, has a peduncle as long as our plants. From this it would seem that Schumann's distinction (a sessile inflorescence) between *H. aurantiaca* and *H. Choconiana* will not hold. *H. Choconiana* is very close to *H. aurantiaca*, or at least to *H. brevispatha*, which was described as synonymous with it. The peduncles of our specimens are as long as those shown in Hooker's figure and the leaves are similar, but in his species they are broader with short petioles, not clasping. The distinction between the two should be the floral and foliar characters instead of the length of the peduncle.

***Heliconia crassa* sp. nov.**

The habit of this plant may be said to be somewhat intermediate between the typical *Stenochlamys* and the rest of the genus. The stem elongates between the nodes so that the leaves are borne along it, as is the case in the former group; but the petioles, instead of diverging at an angle from the stem, continue in nearly the same direction, which is characteristic of the other subgenera. They have at the summit, however, a sharp bend of nearly 90°, so as to bring the blades into the same relation to the stem as is usual in *Stenochlamys*. Such a bend at the summit of the petioles was also seen in several species of the other subgenera (only among those with erect stems); but its amount was small, in no case more than 30°. When growing in shady places this species may attain a height of 2 m., but most of the plants are only about half as tall.

Leaves to 30 cm. long, 9 cm. broad, lanceolate, at the tip acute, at the base oblique or equilateral, rounded or cordate, thick, green, glabrous, and glossy on both sides; principal nerves on the upper surface 5 mm. apart—an unusual distance for so small a leaf; blades sessile or on petioles up to their own length:

inflorescence glabrous; peduncle 5–30 cm. long, pointing in the same direction as the stem, not necessarily upright; panicle about 7 cm. long, of half a dozen horizontally divaricate bracts on a flexuose vertical rachis, orange-yellow shading into orange-red on the cheeks of the bracts; the lowest bract often sterile, ascending and expanded into a greater or lesser blade, the others distant from each other by about their own depth, 3–6 cm. long, about 2 cm. wide, mostly subovate: flowers about 15 to a branch-bract, yellow, as long as the upper bracts: flower-bracts shorter than the flowers, 2–3.5 cm. long, nearly 1 cm. broad: pedicels about 1 cm. long: berries 5 mm. in diameter in the dry specimen.

Heliconia crassa is abundant on the mountains between Sepacuité and Secanquim (on the road from Cahabon to Senaju), but does not cross the divide into Sepacuité. It is oftenest found on the hot hills of the region, which are overgrown with bushes and small trees. It prefers the full glare of the sun. Nos. 356 and 376 (type).

It is close to *H. subulata* Ruiz & Pavon; it resembles their figure closely, but on examination of the description it is found to differ in several respects. It is only a third as large as *H. subulata* sometimes grows; the leaves of that species reach a meter in length and the inflorescences 30 cm.; the panicle in *H. crassa* is erect, not pendulous; the branch-bracts are much broader, not yellow, tipped with red and not turning red in fruit; and the flowers are fewer to a bract. Its similarity to *H. subulata* suggests possible affinities with the other forms referred to *H. psittacorum* L. as varieties. It has no resemblance to *H. angusta* Vell., which has been considered a synonym of *H. subulata*; beside differences in the inflorescence, that species has leaves more than eight times as long as broad. *Heliconia Andreensis* Kl., which has been considered another synonym of *H. subulata*, is nearer, but it also has longer leaves; its spathes are narrower, not channelled, and its flowers are very much larger, orange, and *distinctly black-tipped*. From *H. Schomburgkiana* Kl., which, however, is very inadequately described, it differs at least in the broader conduplicate branch-bracts. Eichler's variety, *spathacea*, which has been considered identical with it, has, as shown by Petersen's figure, long narrow leaves almost like the species. Petersen's variety, *gracilis*, has not been taken up by recent writers because of insufficient description; the

branch-bracts are broad like those of *H. crassa*, but no mention is made of the leaves, which would, therefore, be expected to be like those of *H. psittacorum* and very much narrower than those of the present species.

***Heliconia Collinsiana* sp. nov.**

The few plants of this species we saw were growing in a clump at the top of a steep bank by the roadside. They were lopping over upon the surrounding shrubbery as though unable to stand alone; the leaves were spread out to catch the sun like those of *H. Borinquena* (f. 3).

Whole plant about 5 m. long: leaf-bases 2.75 m., petiole 1 m., blade 1.25 m.; blade oblong, gradually narrowed to the tip, obliquely cordate at the base, decidedly inequilateral in the type, the sides being 17 and 22 cm. respectively, bright green above, below very glaucous, with a little fine fuzzy pubescence on the midrib, otherwise glabrous: inflorescence bright red, glabrous, 45 cm. long, pendent on a slender peduncle 30 cm. long; branch-bracts lanceolate, the lowest linear-lanceolate, gradually narrowed to a blunt tip, very distant on the very flexible but slightly flexuose rachis, lowest 30 cm. long, 4 cm. broad, those half way up 15 cm. long and 3 cm. broad: flowers and their bracts not seen; few flowers (less than a dozen) to a branch-bract: pedicels 15–25 mm. long: berries 15 mm. in diameter when fresh.

On the bank of the Cahabon river about five miles below the ford by which the road crosses to the town of Cahabon (no. 352). It gives me great pleasure to name this species after my friend and associate, Mr. G. N. Collins; but for his pointing it out to me I would have ridden by without seeing it.

Donnell Smith's no. 2102 from Masagua, Escuintla, is probably the same species. The leaf with his specimen is only 52 cm. long, 25 cm. wide, ovate and green below; its slender petiole, however, shows that it is not one of the large leaves of the plant, but from one of the small lateral suckers whose leaves are always shorter than those of the main stem. The same fact may also explain the absence of glaucescence, but the whole group is very variable in that respect. The inflorescence of this specimen resembles that of the type closely, but the branch-bracts are somewhat broader and each has more flowers.

According to the artificial key given by Schumann *Heliconia Collinsiana* could belong only with *H. pulverulenta* or *H. glauca*,

but it is very different from both. *H. glauca* has a red rachis, pedicels and fruit, combined with green bracts and flowers. *H. pulverulenta* belongs to *Stenochlamys*; its peduncle is not drooping, the inflorescence is much smaller with fewer bracts, the rachis straighter and the bracts closer. The relationships of the present species are more probably with *H. pendula*. Donnell Smith's no. 4635, which was doubtfully labelled as that species by Baker, is closely related to the present plant but has a very hairy inflorescence and differs in other characters. It seems, however, to differ from *H. pendula* also. The present species differs obviously from the latter in the glabrous inflorescence and the longer branch-bracts.

***Heliconia librata* sp. nov.**

At the time of our visit this species had passed its season and, though many plants were observed, none were seen with fresh flowers; the inflorescences of all were dead and dry like the type, which was in the same condition when collected as now. The habit of the plant is like that of *H. latispatha*, which the present plant resembles much in all respects except the inflorescence. It is erect in all its parts.

About 3 m. tall: stem 75 cm. long: petioles 90 cm. long; blade 115 cm. x 25 cm., oblong-elliptical, rounded and abruptly short-acuminate at the base, acute or slightly acuminate at the tip, glabrous, glaucous below: inflorescence on a very long (75 cm.) erect peduncle, green according to the statement of the Indians, triangular in outline, almost as broad as long, composed of 12-16 bracts about a centimeter apart, most of them extended at right angles to the straight rachis; type inflorescence glabrous except for a few hairs on the rachis; branch-bracts (except the upper) lanceolate, the lowest sterile, 20 cm. long, 4 cm. broad, with a small lamina at its tip; largest of the fertile bracts about half as long but of the same width, the topmost only 3 cm. long: pedicels 10-15 cm. long.

Heliconia librata is a lowland form, abundant in the upper part of the Oxec valley, but does not occur in any other region we visited (no. 696, Cherujija Oxec).

According to the artificial keys it belongs in Baker's section *Stenochlamys* and would be nearest to *H. glauca*, which it scarcely resembles even in general appearance and differs from sufficiently, as far as characters go, in having the leaves more than twice as

large, the internodes of the rachis shorter and the bracts more numerous. The relatively short rachis and the long peduncle, with the comparatively large number of branch-bracts, suggest that this plant is near those species with a head of densely imbricated bracts for which the section *Taeniostrobis* was erected.

***Heliconia tortuosa* sp. nov.**

Whole plant about 3.5 meters in height (trunk 1.75 m., petioles 75 cm.): leaves about a meter long, 20–30 cm. broad, rounded and oblique at the base, abruptly short-acuminate at the tip, bright green and glabrous on both sides except that the midrib, below, and the petiole bear more or less coarse matted brown hair: inflorescence brilliant scarlet, erect or nearly so; peduncle long, stiff, aligned with the stem; lowest bract often developing a large blade, sometimes nearly as large as the other leaves; rachis extremely flexuose; the few bracts (about half a dozen) distant from each other by about their own depth, not truly distichous but arranged in a sort of spiral with an angle of about 120° between them, lowest about 12.5 cm. long, 5 cm. broad; the upper nearly as large, subovate, triangular, straight-sided, not tapering, with a blunt frayed point; rachis between the upper bracts attaining its full extension almost as soon as they separate from the head formed by those above them which have not yet opened out; bases of bracts at least, and rachis covered with matted brown wool: flowers green, 5–7 cm. long, projecting above the edges of the branch-bracts; flower-bracts two thirds as long as the flowers; floral parts glabrous except for an occasional hair. (PL. 29, F. 1.)

No. 17; photographs 3610 and 4130. *Heliconia tortuosa* is the only representative of the genus common about Sepacuité, but in the valley which the plantation occupies it is one of the most conspicuous plants; it grows everywhere except in the thickest woods where the light is too weak. Donnell Smith, *no. 1828*, Pansamalá, Alta Vera Paz, alt. 3800 feet, April, 1899. The bracts are longer and narrower than in our specimen.

Heliconia tortuosa is very similar to *H. villosa* Kl., from Colombia, or at least to the printed descriptions of it. The similarity is due, I suspect, more to lack of detail in the descriptions than to resemblance in the plants. Petersen's plate in the "Flora Brasiliensis" shows a very different plant from the present and emphasizes the discrepancies between the two. The Guatemalan species differs from the Colombian in having (1) a peduncle straight and

stiff, not curved; (2) an oblong, not a deltoid, panicle; (3) a very flexuose rachis; (4) bracts not approximated and fewer than in *H. villosa*; (5) flower-bracts glabrous, shorter than the flowers, not hirsute and of the same length; (6) flowers larger, glabrous, not hairy, pedicelled, not sessile, ovary glabrous, not pubescent; (7) leaves obliquely rounded at the base and short-acuminate at the tip, not subattenuate, alike at both ends.

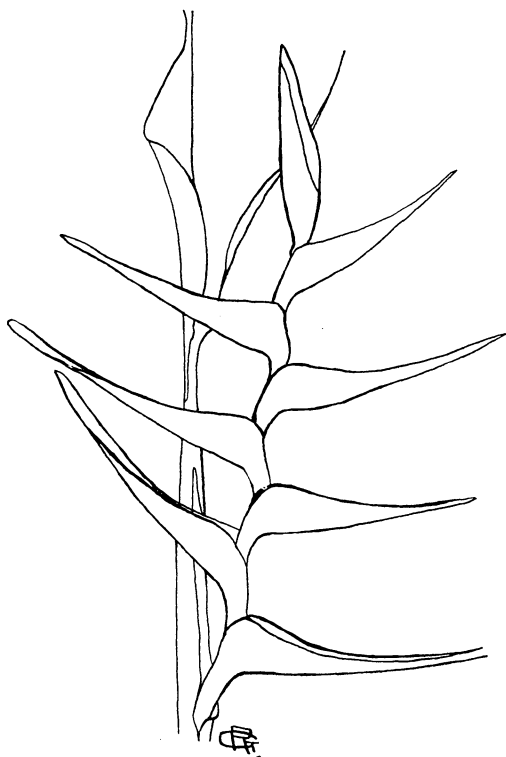


FIG. 1. *Heliconia latispatha* Benth. Inflorescence just before anthesis. Note that though the branch-bracts are quite narrow, the flowers are not visible. Traced from a photograph by Mr. G. N. Collins (no. 129).

HELICONIA LATISPATHA Benth

Whole plant about 2.5 m. tall; stem 15 cm. in circumference, green at the base but above and on the petioles covered with a thin evanescent bloom; petioles about 50 cm. long; leaf-blades 1 m. by 30 cm., short-acuminate at the tip, obliquely narrowed to

the base, glabrous on both sides except for the midrib which is somewhat hairy, slightly glaucous below: inflorescence borne at the summit of a long (60 cm.) peduncle; lowest bract, which is sterile, and sometimes the next, expanded into leaves which may attain a large size; branch-bracts 8-10, rich orange, rachis greenish-orange; bracts narrowly lanceolate; one from the middle is 15 cm. long, 3-4 cm. broad (dry): flowers very small, entirely hidden below the edges of the bracts, 30-35 mm. long, subtended by triangular-ovate bracts of about the same length and 12-15 mm. broad, pedicels apparently not pubescent as they are described in *H. latispatha* and there is no hair on any part of the inflorescence. (FIG. 1.)

Secanquim, about half way between Senaju and Cahabon (no. 262, photographs 128, 129). It is very abundant on the hillsides around Secanquim, where it occupies the same place in the plant societies as does *H. tortuosa* higher up about Sepacuité.

Donnell Smith, no. 1829, Rio Dulce, Dept. Livingston. In this specimen, which is more mature than ours, even good sized fruits are very short-pedicelled and barely look over the edges of the narrow branch-bracts.

The panicle is oblong in outline like that of *H. tortuosa*, to which the present plant is closely related. As in that species the branch-bracts are not truly distichous, but are only approximately opposite and the rachis is strongly flexuose. But the peduncle is much longer, so that the inflorescence though originating at about the same part of the plant is much higher up; instead of being half way down the stem it is about level with the bases of the leaves.

***Heliconia spissa* sp. nov.**

Plant about 2 m. long, with a habit like *H. Borinquena* (f. 3), leaning over with its leaves all horizontal: blade 75 cm. long, 20 cm. wide, oblong-oval, acute at the tip, rounded to the base, green and glabrous except for the under side of the midrib which bears more or less coarse brown hair; main nerves only 3 mm. apart—whence the name: inflorescence practically sessile (on a peduncle only 25 mm. long), stiffly erect, thickly covered with soft short brown hair except on the edges and channels of the bracts, rachis straight, hardly flexuose; branch-bracts distant from each other by more than their own depth except near the tip of the panicle, oblong-lanceolate, acute or obtuse, the lowest 17 cm. long, 1.5 cm. broad; lowest fertile bract 8 cm. long, 1.5 cm.

broad, uppermost 4 cm.; whole inflorescence bright yellow, shading to orange on the cheeks of the branch-bracts: flowers a dozen or less to the bract, about 4 cm. long, yellow, densely covered with the same soft short hair as the rest of the inflorescence, not scabrous; flower-bracts 25 mm. long, nearly 10 mm. broad, triangular acute, densely pubescent, especially on the midrib; pedicels 1 cm. long, hairy: berries (not ripe) also hairy.

Along the road from Cahabon to Senaju (*no.* 359) growing on a steep river bank a mile further east than *H. Collinsiana*. It is known to me from a single clump with only one inflorescence.

Heliconia spissa very nearly corresponds with the descriptions of *H. Schiedeana*. But they are lacking in detail except as to floral characters. The most obvious difference is in the color of the branch-bracts, which is red in that species but yellow and orange in the present.

***Heliconia elongata* sp. nov.**

Plant generally erect in all its parts, 2–4 m. tall (type, 3.5 m. with a stem 1.5 m., petiole 0.5 m., blade 1.5 m.), glabrous: leaf elongated-oblong, only one seventh as broad (22 cm.) as long, very long-cuneate at the base, rounded to the suddenly short-acuminate tip, green on both sides; mid-rib very large and stiff, 15 mm. in diameter near the base of the leaf: inflorescence upright, without a peduncle, oblong in outline, composed of a dozen or more deeply boat-shaped bracts with clasping bases which hide the stiff, straight rachis; branch-bracts green on the edges and bottom, shading through yellowish-green to a small patch of weak, light red on the cheeks but nowhere crimson; one from the middle of the spike 13 cm. by 9 cm. (measured dry), all ovate, gradually tapering to the sharply acuminate tip: flowers 8 cm. long, bright green at the exposed tips, just projecting above the edges of the branch-bracts; segments of the perianth linear oblong; flower-bracts 5 cm. long, 2 cm. broad, triangular-ovate. (FIG. 2.)

No. 790. It grows all along the Polochic River and up into the hills to an altitude of about 2,000 feet along the road from Panzos to Sepacuité, where a few clumps of it were seen growing with *H. Champneiana*. It covers a greater area and thrives under more varied conditions than any other species studied.

Donnell Smith, *no.* 1830, "Monte Cachirulo, Depart. Yzabal, alt. 700 pp. April, 1899."

Heliconia elongata is closest to *H. humilis* but differs in stature, in the shape of the leaves and in having nearly twice as many branch-bracts, which are not nearly as highly colored, those of *H. humilis* being deep scarlet with only a narrow margin of green near the tip. It also resembles *H. rutila* (see below), but differs



FIG. 2. *Heliconia elongata* sp. nov. The type clump, showing how conspicuously erect are the inflorescences, regardless of the stem angle. Traced from a photograph.

in the narrow perianth-segment, the wider more numerous *green* and red branch-bracts and the shape of the leaves.

In studying *Heliconia elongata*, it has been necessary to determine *H. Bihai*. That species is the type of the genus and for a long time was the only one recognized. As is not unusual in monotypic genera, to the one species were referred all the *Heliconias* discovered for a long time. In this way *H. Bihai* became

a "composite" to which different authors referred very different plants, and consequently has been a source of much difficulty and confusion. This confusion has continued to the present time, and the recent monographers have not cleared it away but have made their descriptions so general as to include most, though not all, of the various plants described in the places they cite. To determine what *H. Bihai* really is and to limit the name to a single species is not an easy task, but it is necessary for any precision in dealing with it and the related species. In attempting to make such a determination we are aware of the great possibility of error, but we consider it less serious to commit a nomenclatorial blunder by applying the name to the wrong plant than to make the taxonomic mistake of referring several species to one. Besides it is more likely that any nomenclatorial uncertainty will be removed, if it can be, after the species themselves are differentiated.

For some reason Linnaeus in what is, for nomenclatorial purposes, the original description * in the "Species Plantarum," cited Plumier's last species (*variegata*) first. Were this determinable it would be the type of *H. Bihai*, but beyond the reference to the variegated branch-bracts we know nothing about it and there seems to be no way of finding out anything else. Therefore we reject this species from consideration and take up the next cited, one with scarlet bracts, which was Plumier's first species. The early French writers that had access to Plumier's manuscripts are united in considering that this was the species figured by Plumier and in calling it *Heliconia Bihai*. Their figures and descriptions are in substantial accord with his but add a great deal to them. Burmann, in 1756, published a plate from Plumier's manuscripts showing the whole plant and the floral parts full size. The drawings of the flowers are almost identical with those published earlier by Plumier himself, and almost certainly came from the same species. Plumier, in the earlier work, gave no hint as to which of the three species he was figuring, but the identity of his

* "MUSA spadice erecto.

Bihai.

Bihai amplissimis foliis, florum vasculis variegatis. *Plum. gen.* 50.

Bihai. *Ovid. l.* 8, c. 9. [Should be lib. 7. cap. 9. — R. F. G.]

β. *Bihai* amplissimis foliis, florum vasculis coccineis. *Plum. gen.* 50.

γ. *Bihai* amplissimis foliis, florum vasculis subnigris. *Plum. gen.* 50.

Habitat in America calidiorē."—L. Sp. Pl. 1043. 1753.

figures and Burmann's show that both were drawn from the species with scarlet branch-bracts which alone was referred to by Burmann. This *Heliconia Bihai* may be briefly described as follows :

HELICONIA BIHAI L.

Bihai florum vasculis coccineis Plum. N. Pl. Am. Gen. 50. *pl.* 3. 1703.

Musa Bihai L. Sp. Pl. 1043. 1753 (in part).

Bihai Plum. Pl. Am. ed. Burm. 49. *pl.* 59. 1756.

Heliconia Bihai L. Mant. Pl. 211. 1767 (in part). Jacq. Pl. Rar. Hort. Schoen. 1: 26. 1797. Lam. Encyc. *pl.* 148. 1823. L. C. Richard, Nova Acta, 15, suppl.: 22. *pl.* 8, 10. 1831.

Whole plant 3-4 m. tall, erect, glabrous : leaves subdistichous, nearly 2 m. long, 50 cm. broad, round at both ends, long-petioled : inflorescence stiffly erect ; peduncle thick, as long or longer than the straight rachis, raising the inflorescence up among the leaves ; branch-bracts scarlet, broadly ovate, acuminate, mostly concealing the rachis : perianth-segments narrow, oblong linear ; flower-bracts ovate, acute.

The habitat of this plant is uncertain, but it probably came either from one of the French West Indies, most likely Martinique, or from Guiana.

This clears the way for the consideration of the other plants confused with *H. Bihai*. The first was described by Swartz (Obs. Bot. 96. 1791). The description is mostly of flowers and is hardly definite enough for specific determination. Its bracts, however, are different in color from those of *H. Bihai* and on that account it was renamed *H. luteofusca* by Jacquin.

In Andrews's Repository (*pl.* 640) is figured as *H. Bihai* a species with a sessile inflorescence whose bracts are purple with bright yellow edges. In general appearance it is similar to *H. humilis*, though taller. For this the name **Heliconia purpurea** is suggested.

Another so-called *Heliconia Bihai* was figured by Loddiges (Bot. Cab. *pl.* 252) and by Edwards (Bot. Reg. *pl.* 374). The plant is about 3 meters high, with few leaves and erect habit like *H. elongata*. Inflorescence sessile, upright ; rachis red (visible), but little flexuose ; bracts narrow, ovate-lanceolate, hardly touching each other, red with yellow margins ; flower broad and short,

perianth-segments broad, flower-bracts ovate. It differs from *H. Bihai* in the habit, in the acute leaf and in the sessile inflorescence; and from *H. purpurea* in the color and width of the bracts. For this plant the name ***Heliconia rutila*** is suggested.

A fourth species is described by Petersen in the *Flora Brasiliensis* (3³: 16. *pl.* 5). This, Petersen himself believed to be different from Richard's species, but he supposed it to be the same as Swartz's, to whom he credits the name. It differs from *H. Bihai* in having acuminate glaucous leaves; a long, weak, flexible peduncle, a very flexuose rachis with internodes 3-5 cm. long; distant, narrow, branch-bracts; and triangular flower bracts. For this species the name ***Heliconia distans*** is proposed. As the *Flora Brasiliensis* is not accessible to everyone, it may be of interest to add that a reduction of Petersen's plate of *H. distans* is given in Schimper's *Pflanzen-geographie*, page 359.

For a summary, a key to the species confounded with *Heliconia Bihai* may be given:

- Peduncle long, stiff, erect; branch-bracts red, broad, close together; leaves round at both ends, green on both sides. *H. Bihai.*
- Peduncle long, flexible, curved; branch-bracts red and yellow, narrow, distant; leaves acuminate, glaucous below. *H. distans.*
- Peduncle none, leaves green on both sides, acute.
 - Branch-bracts red and yellow, narrow, barely touching each other; perianth-segments short and broad. *H. rutila.*
 - Branch-bracts purple and yellow, broadly ovate, close together; perianth-segments linear. *H. purpurea.*

***Heliconia Champneiana* sp. nov.**

Whole plant 5.5 m. tall (stem 1.5 m., petiole 1.5 m., blade 2 m.), erect: stems, petioles and blades of the leaves upright and turned in all directions, *i. e.*, tangential to circles centering in the stem: stem beset with long, straight light brown hairs projecting at right angles: leaves 2 m. long, about 50 cm. wide, tip rounded, not acute, base obliquely cordate; covered when young with a slight bloom on the under surface, which disappears with age and in drying, leaving them green and glabrous on both sides: inflorescence about 45 cm. long, oblong in outline, composed of about 9 bracts, bright orange with occasional red splashes: peduncle short and stout, not more than 25 cm. long, hairy; branch-bracts close together, hiding the rachis and touching the base of the next above them, on the other side; upper nearly uniform in shape and size, about 14 x 11 cm. (measured dry), broadly ovate,

deeply boat-shaped, slightly tapering to a blunt somewhat incurved tip; rachis straight, glabrous like the bracts; each bract very many-flowered: flowers about 7.5 cm. long, green outside, white inside, pubescent in two broad lines up the back, otherwise glabrous; flower-bracts glabrous, nearly as long as the flowers, quite broad. (PL. 30.)

No. 528; photographs 4, 5. *Heliconia Champneiana* was first seen on the steep mountain side up which zigzags Mr. Champney's road from Panzos to Sepacuité. Later it was observed east of Cahabon in the valley of the Oxec river. It gives me much pleasure to associate with this species the name of Mr. Kensett Champney, whose great and precise knowledge of the flora, fauna, customs and language of the country makes him an authority on all that pertains to the natural history and anthropology of Alta Vera Paz. To him we are indebted for a great deal of valuable information and for all the courtesies which he and Mr. and Mrs. Owen united to show us during our visit to Sepacuité.

Heliconia Champneiana may be taken as the type of a very compact and natural section of the genus including *H. rutila*, *H. purpurea*, *H. elongata* and *H. Borinquena*. These are all characterized by practically sessile, erect inflorescences, stiff straight rachises and by relatively broad often clasping branch-bracts.

***Heliconia Borinquena* sp. nov.**

This species is very similar to the Guatemalan plant just described, but is somewhat smaller in all its parts. Whole plant 3-4 m. long with 3-5 leaves on petioles about 1 m. long and sheathing bases twice as long. Its habit is different from *H. Champneiana*; instead of growing erect it leans over and spreads out all its leaves horizontally. (FIG. 3.)

Leaves 1-1.25 m. long, about 30 cm. broad, rounded at the base, acute or short-acuminate at the tip, glabrous, green above, decidedly glaucous beneath: inflorescence conspicuously upright no matter what may be the position of the stem, glabrous throughout, oblong, about 30 cm. long, half as wide; branch-bracts 8-10, very broadly ovate, broader than in *H. Champneiana*, all except the lower nearly as broad as long (one from the middle of the spike measures 12 cm. both in breadth and length), closely clasping and overlapping each other at the bases so that the side of one is on a level with the bottom of the next above it, on the

same side of the rachis, much closer than in *H. Champneiana*; their tips long, subulate, recurved with revolute margins; flowers greenish, about 11 cm. long, tips projecting above the edges of the branch-bracts; flower-bracts about 9 cm. long. (PL. 29, F. 2.)

Growing on the steep sides of a wet clay ravine amid a tangle of tropical underbush, near the military road, 13 km. north of Cayey, Porto Rico (Underwood and Griggs no. 363, June 24, 1901; photographs 2827 and 2829.)

Our specimens of *H. Borinquena* are, with one exception, the only representatives of the genus in the National Herbarium from

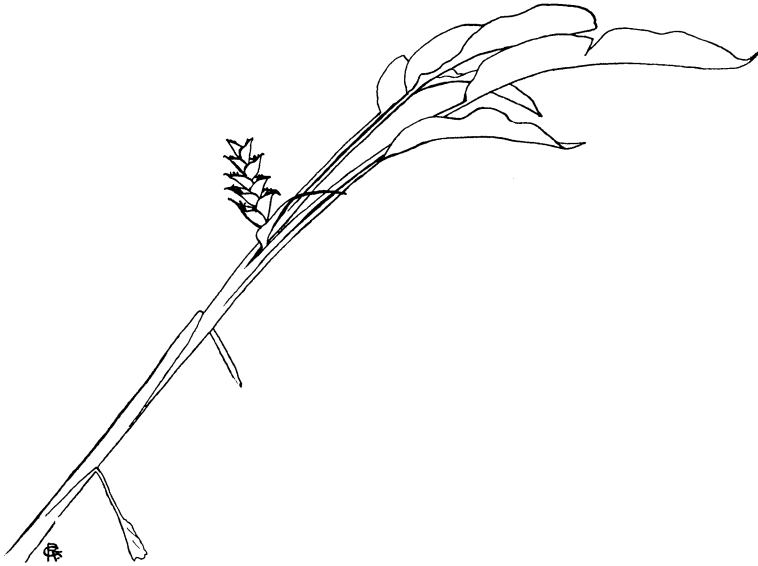


FIG. 3. *Heliconia Borinquena* sp. nov. Whole plant, showing the habit and the upright inflorescence. Traced from a photograph by Mr. G. N. Collins (no. 2827).

Porto Rico. The exception is Sintenis's no. 1131 from near Bayamon, which was determined as *H. Bihai*. Since, however, that species has leaves green on the under side such a reference is probably a mistake, for the leaves of Sintenis's specimen are very glaucous below. Its leaves suggest *H. Borinquena*, for they are of about the same texture and size—as far as one can tell from the fragments preserved—but it has a long slender peduncle and the bracts are longer, narrower and triangular-ovate, without the subulate recurved tip (in the specimen).

Heliconia Borinquena and *H. Champuciana*, which is closely related to it, are easily distinguishable from the others of the group to which they belong by the orange branch-bracts, for all the others are margined with a color different from that of the cheeks.

HELICONIA MARIAE Hook. f.

This species is a giant in a genus of giants ; it sometimes reaches a height of 12 meters when growing in the shade and protected from the weather. Most plants are, however, not more than two thirds as large. Its general appearance when growing in masses is strikingly similar to that of a banana plantation, though the individual plant would never, even if not in flower, be mistaken for a banana, because of the smaller number of leaves.

Leaves 2-3 m. long, about 60 cm. broad, oblong-elliptical, obliquely subcordate at the base, acute at the tip, when young covered with a slight evanescent bloom : inflorescence a dark rose-color, at the end of a long (60 cm.) nodding peduncle ; bracts densely imbricated, concealing the rachis in the fresh specimen, panicle generally not much longer than broad, but sometimes very long, with very many branch-bracts ; lowest fertile branch-bracts slightly reflexed, ovate, 8-9 cm. long, 7-8 cm. broad, attenuate to a blunt frayed tip, narrowed to the base, those from the middle of the inflorescence nearly orbicular when spread out, 6-7 cm. long, 7-8 cm. broad, widest at the middle, narrowed both ways to the blunt tip and base, with more or less short soft brown hair : flowers about ten to a branch-bract, their exposed tips rose, fading into white on the shielded portions, 4-5 cm. long, with flower-bracts a little shorter and sometimes at least 2 cm. broad, often conduplicate and keeled below where compressed by the surrounding flowers, part of them hairy ; ovary white, turning deep blue when ripe ; pedicel very variable in length.

There are some discrepancies between this plant and the descriptions of Hooker's plant, but they are mostly in size and hairiness. In more constant particulars they seem to correspond very well.

This species grows abundantly around and a little above Panzos (*no. 787*). None of it was seen along the Polochic, nor does it ascend to Sepacuité. A solitary clump was seen in the valley of the Oxec.

Beside the species already described one other was collected in the valley of the Oxec. Only one plant was seen and that

toward night when we were hurrying to reach our destination, and a part of this specimen was lost, so that it is better to pass it till another time when fuller material can be had. It was of the subgenus *Stenochlamys*, perhaps closest to *H. cannoidea* Rich., 1.5 m. tall, with seven leaves, 40 cm. long, not quite 10 cm. broad, sessile with long acute bases, acuminate at the tip; green and glabrous on both sides; peduncle a little less than 10 cm. long; inflorescence bright scarlet, about the same shade as in *H. tortuosa*, rachis deflexed, flexuose, lowest bract 17 cm. long with a small blade at the end, next 9 cm., both about 2 cm. broad (no. 693).

Explanation of Plates

PLATE 29

FIG. 1. *Heliconia tortuosa* sp. nov. The inflorescence, one half natural size. Photographed in the field by Mr. G. N. Collins (no. 3610).

FIG. 2. *Heliconia Borinquena* sp. nov. The inflorescence, one half natural size. Photographed by Mr. G. N. Collins (no. 2829).

PLATE 30

Heliconia Champneiana sp. nov. A portion of the type in situ showing the upright habit. (Photograph no. 5.)

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